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Leaflets of western botany.

San Francisco:[J. T. Howell],1932-1966.

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the nature of a tableland, its shores rising abruptly to a height of 200 to 300 ft. elevation. The mound-like peaks near the center of the island have an elevation of 850 to 861 ft. Cuyler Harbor, where Cabrillo landed, is the most sheltered harbor on the southern coast, though navigation is dangerous owing to the many low reefs, the fogs, and the winds. Dr. Greene found only three shrubby species, *Heteromeles arbutifolia*, *Lavatera assurgentiflora*, and a few stunted specimens of *Rhus integrifolia*. These shrubs were all apparently verging to extinction. Dr. Greene collected 121 phanerogams, 7 of which he described as new. No ferns were found.

Mr. Ralph Hoffmann began to collect on the islands in 1925 and added many species to former lists. On San Miguel, he collected 74 not listed by Dr. Greene. Among these were 18 species of grasses, all cosmopolitan except *Poa Douglasii*. The common small rush, *Juncus bufonius*, was the only other addition to the monocotyledons.

MY VISITS TO GUADALUPE ISLAND

BY JOHN THOMAS HOWELL

I have made two short visits to Guadalupe Island off the coast of Lower California, both with Mr. Templeton Crocker on his yacht *Zaca*. My first visit was in November, 1931, when I spent two days ashore near the north end of the island and one day at the south end inland from Melpomene Cove; the second visit was in March, 1932, when the Templeton Crocker Expedition of the California Academy of Sciences stopped at the island for three days *en route* to the Revillagigedo Islands and the Galapagos Islands. Since even after nine years no complete account of these visits has been given, I am taking this opportunity to record some of my observations made at that time and later plan a list of the vascular plants which I collected.

Guadalupe Island is composed of volcanic rocks and lies about 135 miles west of the coast of Lower California, a little above the middle of the peninsula. In outline, resembling an elongate mis-shapen Indian arrowhead with nearly a north-south axis, about 20 miles long and up to 7 miles wide, the island rises

from oceanic depths as a colossal peak, of which only the upper fourth is above water. Its shores rise precipitously at nearly all points directly from the sea: near the north end rising to the highest peak of 4500 ft., but at the south end to only 1000 ft. or less. Deep, steep canyons cut back into the island, and here and there along the shore are smaller or larger beaches which are usually awash at high tide, the home of the grotesque Northern Elephant Seal. The elevated ridges at the north end of the island penetrate a higher, moisture-laden stratum of air, and it is there that the trees of the island, the pine, cypress, and oak, are found. The lower southern part is a desert where the sparse vegetation nowhere conceals the raw vestiges of recent volcanic activity.

Thousands of goats, introduced many years ago in a commercial goat-raising project, roam over the island seeking all plant life that they may devour. Because of their ravages, many of the rare plants endemic to the island have been exterminated and it is only a matter of time until the trees disappear too, since they are unable to reproduce. It would seem that the goats have been most destructive on the northern part of the island; from observations I made I judged that they rarely go into the extreme desert at the south end and that there the vegetation may be much less affected.

On my first excursion ashore on November 14, I hoped to climb to the cypress grove high on the top of Mt. Augusta, more than 4000 ft. above sea-level; but immediately I was delayed by liverworts, which proved an irresistible attraction (see D. Suttcliffe, "Hepaticae of Guadalupe Island," *Bryologist* 35:41), and by noon I was lunching in a small cluster of oaks at the head of the rocky canyon above the barracks. I returned later to the *Zaca* without reaching the cypresses to find that Mr. Crocker had brought aboard some delectable botanical booty, found in steep-walled coves along the shore, inaccessible to the ravaging goats.

The next day I climbed to the pines which grow on the narrow top of the high northernmost ridge of the island. To the west of this ridge, which is a veritable hogback in places, a precipice drops to the surf-bordered blue of the Pacific. Pines contorted in trunk and wind-blown in crown cling tenaciously to the rocky wall, framing charming vistas of cliff and sea. Down the steep

slope they grow, together with the island oak, to meet the island palm, *Erythea edulis* (Wendl.) Wats., which marches singly and in small groves up the slopes from the strand. Where else in nature do palm and pine meet to frame such a delightful prospect?

The enjoyment of this inspiring scene and the study of the pines was abruptly terminated by a torrential downpour which seemed to envelop the entire northern end of the island. After it had abated we began our slippery descent to the *Zaca*. Streams of muddy water poured down the gullies, and from the cliffs across the canyon from us a half-dozen waterfalls leapt into the air to mingle below with the muddy torrent in the canyon bottom. Nowhere had the ravaging goats left enough vegetation to hold soil and rocks, and the roar that filled the air was the dull roar of rocks and mud being dragged down to the sea.

The third day, November 16, I went ashore at Melpomene Cove at the south end of the island. Here precipitous bluffs of stratified beds of ash, lava, and lithified mud are capped by a lava flow. The rocks are light colored and are in marked contrast to the dark and more massive volcanic rocks of the northern part of the island. Inland from the cove is a volcanic tableland bounded by ashy ridges and cinder-cones and everywhere is the facies of an extreme desert. Apparently it had not even sprinkled in this parched land although only the day before there had been such a torrential downpour at higher elevations a few miles to the north. It was a region without trees, the most abundant and noticeable vegetation being low scraggly bushes of *Atriplex Palmeri*, thickets of *Lycium californicum*, and hemispherical mounds of *Hemizonia Greeneana*.

Four months later, on March 16, 1932, I again found myself beneath the forbidding dark brown and gray cliffs and ridges of Guadalupe Island's Northeast Anchorage. Intrigued by the problem of insular variations noted in the pines on the island, I again climbed to the pine grove. Small herbs, such as grasses, clovers, and filaree, were abundant among the rocks on the steep slope of the ridge, and the grove itself was especially attractive with its smooth undercover of green grass which was kept well mowed by the goats. The appearance was that of a carefully tended park. Alas! the goats were tending it only too carefully!

The day following, accompanied by Jack Ratikan, able seaman of the *Zaca*, I began a two-day traverse of the island from the Northeast Anchorage near the north end to Melpomene Cove at the south end. It was a grand adventure and it proved very profitable botanically because I found not only a number of the rare island endemics but also a number of plants not reported before from the island. Each of us carried his own bed-roll, Jack carried water and food, and I was loaded with plant-press, camera, and other paraphernalia. Most of the first day was spent attaining the 4000-foot summit of Mt. Augusta and the grove of Guadalupe Cypress. It was a long climb, first up the rocky canyon and steep slopes above the barracks, then over basaltic escarpments and terraces to the crest of the island. The cypress grove presented an extensiveness for which I was not prepared. The fringe of trees along the skyline as viewed from the Northeast Anchorage proved to be only the eastern edge of a fine and beautiful grove which grows on an undulating mesa with a gentle slope to the west. The grove at its northern end thins out to a narrow scattered growth, but a mile farther south it is broad, perhaps a mile wide, and encloses grassy meadows with attractive park-like vistas. For about two miles it extends thus along the summit plateau, at the south edge ending rather abruptly where the plateau drops off into the somewhat lower, middle stretches of the island.

We camped for the night near the southern limit of the cypresses where there was an abundance of dry wood and where we were able to obtain water for tea from pot-holes in the bed of a small stream. Little or no water flowed in the numerous shallow brook channels which extended westward across the cypress grove, their water-carrying being limited to periods of rainfall. From our camp we looked out over the billowy top of a high fog which was perhaps 2000 ft. below us and which extended as far as the eye could see. A north wind blew, a wind which had been violent at lower elevations, but was more moderate and warmer at the top of the island. Darkness fell rapidly after sunset and there was a wonderful golden afterglow; and overhead the night was perfectly clear. An ambition was being realized: I was sleeping out in the only grove of Guadalupe Cypress in the world!

At 5:20 the following morning (March 18), we were up just as dawn began to dim the stars and by 6:30 we were off for the south end of the island. Immediately after leaving the cypress grove, which ended abruptly with the lava plateau, we descended to the middle stretches of the island which is punctuated with numerous cinder cones. Everywhere the ground was covered by loose rocks about the size and shape of a baseball and walking was very difficult and very tiring. About 1.5 or 2 miles south of the cypresses we came to a ghost grove which I took to be what was left of the California Juniper (*Juniperus californica*) reported by Palmer as "all over the middle of the island . . ." (Proc. Amer. Acad. 11:119) and by Greene as on the verge of extinction (Bull Calif. Acad. Sci. 1:217). Apparently the species is now extinct on the island although it once extended for several miles as evidenced by the dead remains. Soon the dead remains of another plant appeared (*Franseria camphorata*), but as we advanced a few live stumps were seen and still farther south we found shrubs a foot or two tall. This seemed to indicate that the ravages of the goats decrease as one passes from the middle of the island southward. Whereas several large herds of goats were seen in the northern part of the island, only a few individuals (6 or 8) were counted in the valley at the south end above Melpomene Cove.

The day was very hot and all the water we had was what we carried. We crossed broad transverse valleys and we skirted others which descended to the coast, but all the time we remained high above the coast in the middle of the island; and everywhere the ground was covered by the rocks that were too small to walk on and too numerous to step between. By noon we reached the peak above Jacks Bay, the highest point in the southern part of the island. Just beyond it we had our first glimpse of Melpomene Cove still far to the south of us and below us, and we hastened on toward the ashy ridges and cinder cones which I had explored the preceding November. In the late afternoon, we were met by men from the *Zaca* who came inland to look for us and they relieved us of excessive impedimenta for the last lap of our tramp. I still paused here and there to collect, but by 5 o'clock I was again aboard the *Zaca*. On the strenuous two-day trip during which Jack Ratikan and I had climbed over a 4000-foot

mountain and traversed about 20 miles of intolerable terrain, I had collected about sixty-five specimens of which twenty had not before been reported from the island or had been known from only a single collection.

THE LUPINUS LATIFOLIUS AGGREGATE

BY ALICE EASTWOOD

All of these have either been considered varieties of *L. latifolius* Agardh or identical with that species and those named as varieties have not been listed in Index Kewensis. Since, after all, the distinction is relative, it has seemed simpler to me in this key to consider all as species. The group may be characterized as follows: plants widely branching above; leaflets generally broadest near the top, generally glabrous above, finely pubescent below; corolla with broad banner and wings; keel ciliate near the base.

KEY TO THE SPECIES

Flowers 15—16 mm. long.

Stems stout and erect, with large, long-petioled basal leaves, pubescence fine and appressed.....*L. Parishii* (C. P. Sm.) Eastw.

Stems decumbent at base, 3—4 dm. tall, villous with long spreading hairs.....*L. Dudleyi* (C. P. Sm.) Eastw.

Flowers 12 mm. long.

Leaves green on upper surface, paler on lower; raceme densely flowered.....*L. Pennellianus* Heller

Leaves green on both sides; racemes loosely flowered.

Pubescence fine and appressed.....*L. lasiotropis* Greene

Pubescence fine but spreading.....*L. cytisoides* Agardh

Flowers 10 mm. long.

Leaves green on both sides, pubescence fine and appressed, leaflets obtuse at apex.....*L. latifolius* Agardh

Leaves green on upper side, paler below, sometimes finely appressed-pubescent above, denser below, leaflets acute or acuminate
.....*L. columbianus* Heller

Flowers less than 10 mm. long; leaves green on both sides.....
.....*L. viridifolius* Heller

LUPINUS PARISHII Eastwood. This species has been discussed in LEAFLETS OF WESTERN BOTANY, 2:181. It is the largest-flowered perennial lupine in the Sierra Nevada, growing in wet places, distinguished by the large long-petioled basal leaves and the keel ciliate near the base.